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耕起体系による土壌物理性の違いが火山灰農地土壌からのCO2フラックスに及ぼす影響
Carbon dioxide flux from Andisol in relation to soil physical properties as affected by tillage systems

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Annual CO2 emission has grown between 1970 and 2004 by about 80%. Pedologic carbon pool is one of the major pools to store a large amount of carbon. Carbon cycle in agricultural ecosystem is one of the resources to emit CO2 from soil to the atmosphere. Since negative environmental impacts of global warming were realized, carbon sequestration by agricultural managements became hot topics recently. Tillage operation changes soil structure and thus soil physical properties, which may affect production and transport of CO2. The relationship between soil physical porosities and carbon dynamics was so complex and the studies focused on Andisol were not enough.

In this study we measured soil physical properties of Andisol under no tillage and tillage treatments. We also measured soil CO2 flux from Andisol under no tillage and tillage treatments by a 150-days incubation experiment using soil columns of 15 cm in diameter.

The results show that, compared with no tillage, tillage significantly reduced soil dry bulk density, and destructed soil aggregates, especially macroaggregates. Relationship between soil air filled porosity and gas diffusivity was well described by a soil-water-characteristic based model for the two treatments. Soil air filled porosity and gas diffusivity under no tillage treatment was higher than that of tillage treatment in tilled layer. Changes in these physical properties following tillage practice were considered as key factors of soil carbon dynamics. Soil CO2 flux under tillage treatment was higher than that under tillage treatment. No tillage may contribute to less carbon decomposition and CO2 emission in soil.

キーワード: 二酸化炭素フラックス, 耕起体系, 土壌物理性, 火山灰土壌
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